Volume 25 Study G-I

STATE OF ALASKA

Bill Sheffield, Governor

Annual Performance Report for

HARVEST ESTIMATES OF SELECTED FISHERIES THROUGHOUT SOUTHEAST ALASKA (Part 2-Juneau Roadside)

By

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RESEARCH PROJECT SEGMENT

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Job Title: Harvest Estimates of Selected Fisheries Throughout Southeast Alaska - (Part-2 Juneau Roadside)

Cooperator: Lee M. Neimark

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ABSTRACT

A creel survey was conducted at 39 fishing areas along the Juneau road system between April 17 and October 1, 1983. Interviews with anglers and randomly scheduled observations of fishing effort were used to estimate effort and harvest at each area. A record level of effort was recorded (60,523 hours), as well as a record harvest of pink salmon (12,663). Dolly Varden (4,650), coho (1,668), flatfish (752), chum salmon (235), cutthroat trout (191), halibut (56), rockfish (51), steelhead trout (18), rainbow trout (9) and other species (1,763 - primarily cod) were also harvested. Sheep Creek beach was the most important area for angling effort and harvest. Anglers fished there for pink salmon returning to the Sheep Creek hatchery. The Dolly Varden catch rate reached a new low level (0.077 Dollies kept per non-targeted hour of fishing). Regulatory closures of Montana Creek and Auke Creek offer protection to Dollies in those systems, but may not be sufficient to encourage general rebuilding of roadside stocks. Experimental stocking of coho smolt in Twin Lakes proved to be a very successful enhancement project, but stocking cutthroat in Moraine and Glacier Lakes failed to generate any fishing activity.

KEY WORDS

Juneau, Alaska, sport fishery, urban, roadside, effort, harvest, creel survey, Dolly Varden, Salvelinus malma (Walbaum), pink salmon, Oncorhynchus gorbuscha (Walbaum), coho salmon, Onchorhynchus kisutch (Walbaum), salmon, trout.

BACKGROUND

The Juneau-Douglas road system provides access to beach, stream, and lake fishing areas (Figure 1). While the angling effort and harvest of the roadside fishery is not as intensive as the marine boat fishery, it is still considerable; and for many (including children and others without boats), the road system provides their only fishing opportunities. The quality of fishing along the road system has become threatened as Juneau expands and its population swells. Therefore, it is necessary to periodically gauge the status of the fishery resource and its utilization. Identification of key recreational areas is the first step in protecting the roadside fishery from the detrimental effects of urban development. Determination of harvest levels is a prerequisite to establishing reasonable management strategies.

The last Juneau roadside creel survey (angler harvest survey) was done in 1980 (Schwan, 1981). Schwan documented a decline in angling effort due to the initiation of restrictive Dolly Varden regulations, a decline in Dolly Varden abundance, weak pink salmon runs, and inclement weather. Schwan's study failed to directly estimate either total effort or harvest. Previous studies (Schwan, M. W., 1980, 1981; Marriott et al., 1979; Robards, F.S., 1978) did provide estimates of total effort and harvest, but did not provide these estimates on a site by site basis since 1972 (Schmidt et. al., 1973).

The 1983 creel survey was designed to provide angling effort and harvest estimates at 39 popular fishing areas (Figure 2). It was also designed to gather clues about the current strength of the local Dolly Varden stocks.
Currently, Montana Creek (and its tributary, McGinnis Creek) and the Auke Lake - Auke Creek watersheds are closed to Dolly Varden fishing. Those systems are believed to be important spawning and wintering areas (Reed and Armstrong, 1971), respectively, that have received too much fishing pressure. Dollies in Montana Creek and Auke Creek were tagged with dart tags to determine their movements and contribution to the sport fishery (Neimark, 1984a).

A list of common names, scientific names, and abbreviations of all species mentioned in this report is presented in Table 1.

RECOMMENDATIONS

Management

1. Support hatcheries as a means to enhance the roadside fishery provided that the following conditions are satisfied:

    a) hatchery production will not adversely affect wild stocks;

    b) hatchery operations will not disrupt existing sport fishing activities;

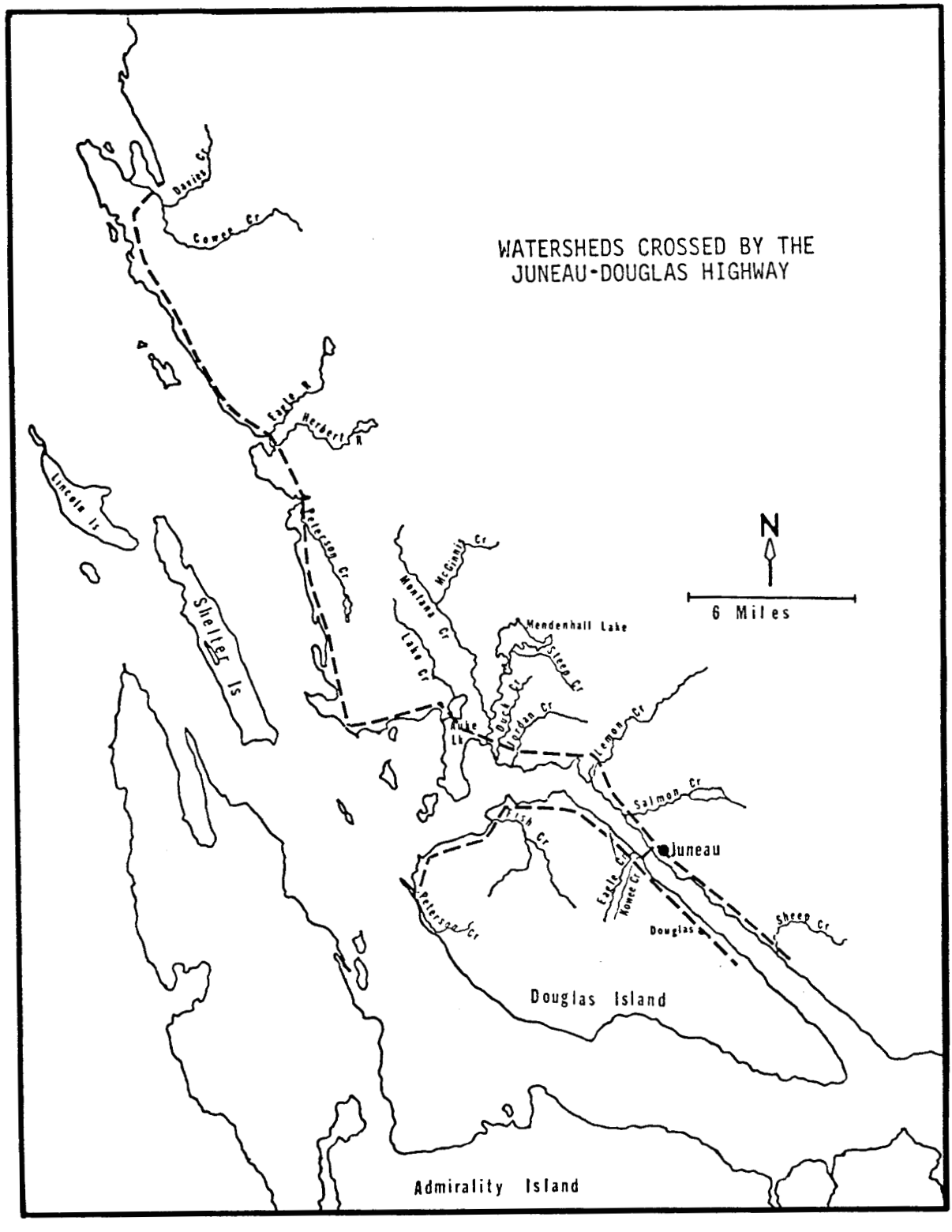

Figure 1. Watersheds Crossed by the Juneau-Douglas Highway (-----).

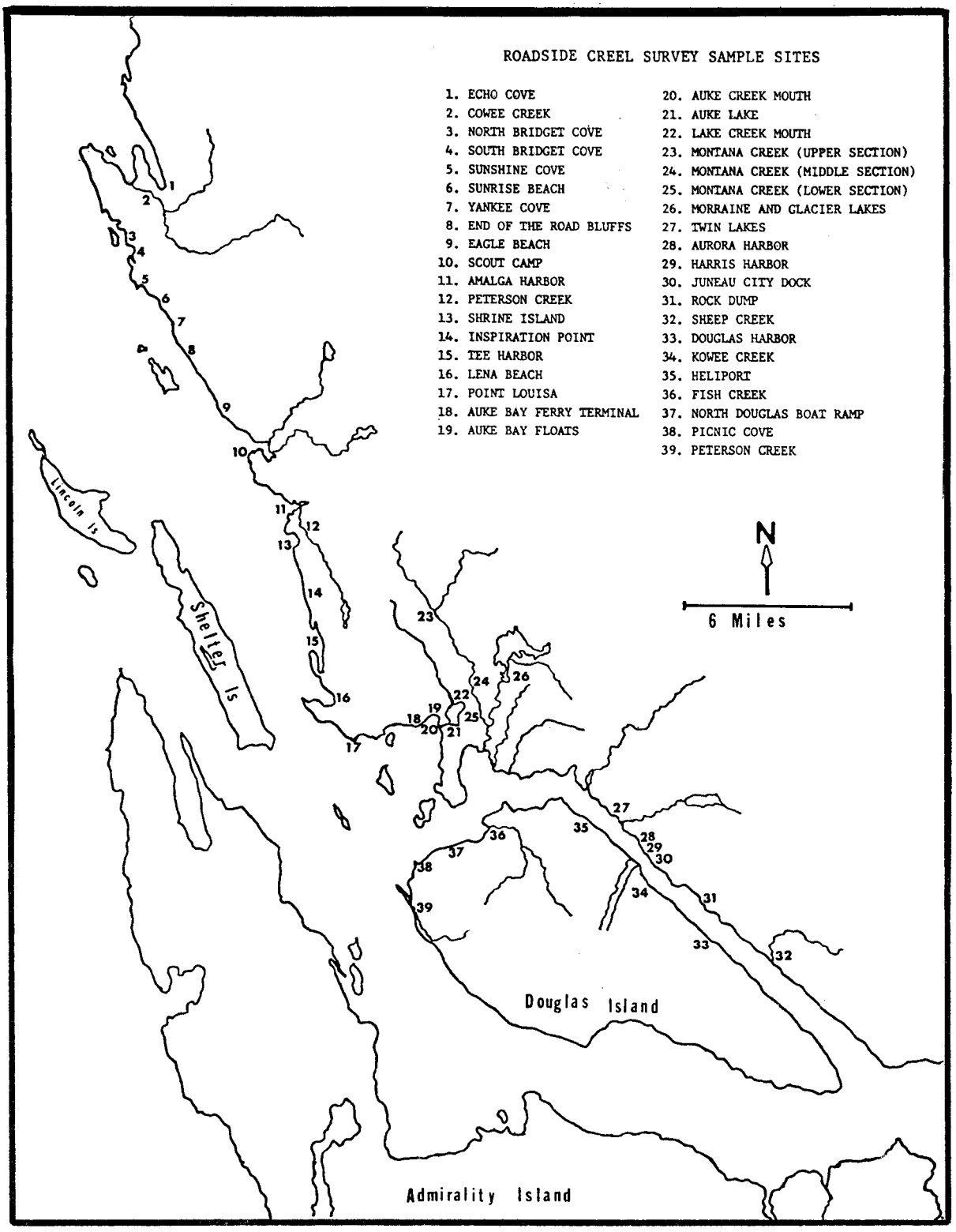

Figure 2. Roadside Creel Survey Sample Sites.

Table 1. List of Common Names, Scientific Names, and Abbreviations.

Common Name	Scientific Name and Author	Abbreviation
Chinook salmon	Oncorhynchus tshawytscha (Walbaum)	KS
Chum salmon	Oncorhynchus keta (Walbaum)	CS
Coho salmon	Oncorhynchus kisutch (Walbaum)	SS
Pink salmon	Oncorhynchus gorbuscha (Walbaum)	PS
Sockeye salmon	Oncorhynchus nerka (Walbaum)	RS
Cutthroat trout	Salmo clarki (Richardson)	CT
Rainbow trout	Salmo gairdneri (Richardson)	RT
Steelhead	Salmon gairdneri (Richardson)	SH
Eastern Brook char	Salvelinus fontinalis (Mitchill)	BT
Dolly Varden char	Salvelinus malma (Walbaum)	DV
Cod	Family Gadidae	COD
Flatfish (ex. halibut)	Order Pleuronectiformes	FF
Pacific halibut	Hippoglassus stenolepis (Schmidt)	H
Rockfishes	Sebastes spp.	RF

c) an unfulfilled demand exists for the species that will be cultured;

d) provisions to guarantee a terminal area sport fish harvest (once brood stock requirements are satisfied) are included in the hatchery management plan.

2. Encourage tagging of hatchery reared pink salmon.

3. Maintain the existing Dolly Varden regulations.

4. Promote better public awareness of fishing regulations through news releases and by posting additional regulatory markers in restricted areas.

Research

1. Conduct a Juneau roadside creel survey at least once every 3 years. Between surveys, employ less expensive methods (i.e., hidden cameras) to monitor angling effort at areas of special interest.

2. Conduct creel surveys at hatchery terminal harvest areas throughout southeast Alaska to gauge the contribution of these facilities to the sport fishery.

3. Continue experimental lake stocking projects in readily accessible areas:

a) continue experimental stocking of coho smolt in Twin Lakes;

b) discontinue plans to stock Dolly Varden in Moraine and Glacier Lakes;

c) investigate the stocking potential of other roadside watersheds.

4. Evaluate the current status of the population of cutthroat stocked in Moraine and Glacier Lakes.

5. Explore methods to improve CPUE (catch per unit effort) as an index of Dolly Varden abundance. Possibilities include limiting data collection to selected index areas and reporting the targeted catch rate for Dollies.

OBJECTIVES

1. Determine the recreational angler effort and harvest of fish at areas accessible from the Juneau road system.

2. Determine the length-frequency distribution of harvested Dolly Varden at each area.

3. Determine the movements and contribution of the Montana Creek Dolly Varden population to the sport fishery.

TECHNIQUES USED

1. Thirty-nine locations where angling effort is known to occur were identified. These comprised almost all of the fishing areas within a few minutes walking distance of the Juneau-Douglas road system. In October, roadside effort is generally restricted to coho fishing; so only the nine areas known to provide coho fishing opportunities were sampled.

2. To simplify sampling, the locations were divided into a northern and southern sampling route. Four temporal strata were examined; weekend mornings, weekend afternoons, weekday mornings, and weekday afternoons. Both routes were sampled once during each strata every 2 weeks. The days and order of sampling were randomly assigned.

3. Sampling was restricted to the daylight hours. It was assumed that an insignificant amount of fishing occurred outside that period. As the length of the day varied with the season, from 10 to 18 hours, the length of the sampling strata varied, from 5 to 9 hours. Allowing a total of 2 hours driving time to complete each sample route, 3 to 7 hours remained for actual sampling (about 10 to 20 minutes per location).

4. Upon arriving at each sample location, the technician began the allotted period of observation, noting the number of anglers and the amount of time they actually fished during the observation period. The technician also interviewed each angler, recorded accrued fishing time, catch, lengths of all Dolly Varden, and whether the angler was still fishing or had completed fishing when he was contacted.

5. The fishing effort at an area was calculated by dividing the observed effort by the percentage of time that sampling occurred. The catch rates at an area were calculated by dividing the total number of fish of each species in the anglers' creels by the total number of hours the anglers had reported fishing. The harvests at an area were calculated as the product of the effort and the catch rates.

6. The percent contribution of Auke Creek Dolly Varden to the roadside fishery was calculated by dividing the percentage of Auke Creek tagged Dollies in anglers' creels by the percentage of fish tagged in Auke Creek.

FINDINGS

Results

Effort and Harvest:

During the surveys, 1,459 anglers were observed fishing along the roadside. Most of these anglers were interviewed, though some, isolated by the high

tide or over a mile from the road, could not be contacted. The interviewed anglers reported fishing for a total of 2,011 hours and harvesting 367 pink salmon, 150 Dolly Varden, plus some coho, flatfish, cutthroat, chum, rockfish, steelhead, halibut and other species, primarily cod (Table 2). The total estimated effort and harvest at each area is shown in Table 3. Surprisingly, 63% of the effort occurred on weekdays. The average length of a completed fishing trip was 1.8 hours during the week and 1.9 hours on the weekend. So, divide rod-hours in half to roughly estimate the number of angler-days of fishing.

During rainy October, effort was slight. Only 59 anglers were observed fishing during the late season sample period. They reported fishing a total of 81 hours at Cowee Creek and Peterson Creek (both on the Juneau side of Gastineau Channel), and harvesting 6 coho and 2 Dolly Varden (Table 4). The total estimated effort and harvest at each area sampled in October is shown in Table 5. To examine seasonal variations in effort and harvest, the data was also analyzed monthly after combining the data from each area (Table 6). (The estimates of effort and harvest are not independent of the manner in which the data are grouped; therefore, the totals of Tables 3 and 6 are not equal) Clearly, July was the most active month of the season for both effort and harvest. The major focus of this activity was a beach fishery for pink salmon returning to the Sheep Creek hatchery.

Dolly Varden:

The mean length of Dolly Varden caught along the roadside was 363 mm (n=122, SD=71, range=140 mm-549 mm). Their length frequency-distribution is shown in Table 7. Not enough Dollies were measured to reach any conclusions about the differences in the length-frequency distributions at each sample area (Table 8). However, it was clear that Dollies harvested in saltwater were larger than Dollies harvested in freshwater (Table 9 and Figure 3). The Dollies harvested in freshwater were primarily of local origin, while those in saltwater may have originated in larger more distant systems, including the Taku and Berners Rivers.

There was no calculable contribution of the Montana Creek Dolly Varden populations to the roadside fishery. None of the 1,828 Dollies tagged in Montana Creek (Neimark, 1984a) were recovered by any of the surveyed roadside anglers. Of the 1,561 Dollies tagged at Auke Lake, only one was recovered by a surveyed angler. Based on that one recovery, the Auke Creek Dolly Varden contribution to the roadside fishery was estimated to be 1%. Table 10 lists the four tagged fish that were caught by interviewed anglers. Seven percent of the harvested roadside coho were reared at Little Port Walter. There were also "voluntary tag returns" from anglers who were not interviewed (Table 11). The fact that two red tags from Montana Creek Dolly Varden were recovered indicates that there was some small contribution of that stock to the fishery, but it appears that the regulatory closure of Dolly Varden fishing in Montana Creek effectively eliminates almost all pressure on that stock.

Table 2. Juneau Roadside Creel Survey - Unexpanded Interview Data, April 17 to October 1, 1983.

Area	Sample Period	Rod Hours	Anglers	DV K*	DV R**	SS K	SS R	PS K	PS R	CS K	CS R	CT K	CT R	SH K	SH R	RT K	RT R	KS K	KS R	H K	H R	BT K	FF K	RF K	OTHER K
1. Echo Cove	4/24 - 09/25	239	115	9	5	0	0	41	1	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
2. Cowee Creek	4/18 - 09/28	212	139	30	54	13	36	30	12	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	3
3. North Bridget Cove	4/17 - 09/28	20	17	15	9	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4. South Bridget Cove	4/17 - 09/28	8	14	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5. Sunshine Cove	4/17 - 09/28	34	33	5	3	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
6. Sunrise Beach	4/17 - 09/28	44	34	6	3	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7. Yankee Cove	4/17 - 09/28	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8. End of the Road Bluffs	4/17 - 09/28	73	40	10	4	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
9. Eagle Beach	4/17 - 09/28	15	7	2	22	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
10. Scout Camp	6/08 - 07/17	19	11	2	16	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11. Amalga Harbor	4/17 - 09/28	68	62	1	7	1	0	12	31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12. Peterson Creek	4/17 - 09/28	69	58	1	23	3	6	1	0	0	0	1	2	2	0	0	9	0	0	0	0	0	0	0	0
13. Shrine Island	4/17 - 09/28	170	120	9	6	2	0	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	7
14. Inspiration Point	4/17 - 09/28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15. Tee Harbor	4/17 - 09/28	0	1	2	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16. Lena Beach	4/17 - 09/28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17. Point Louisa	4/17 - 09/28	103	113	7	8	1	0	19	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
18. Auke Bay Ferry Terminal	4/17 - 09/28	30	25	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2
19. Auke Bay Floats	4/17 - 10/01	150	76	5	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	24
20. Auke Creek Mouth	4/17 - 10/01	81	56	0	0	1	0	42	23	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21. Auke Lake	4/17 - 10/01	7	9	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0
22. Lake Creek Mouth	4/17 - 10/01	20	15	0	0	0	0	0	0	0	0	6	27	0	0	0	0	0	0	0	0	0	0	0	0
23. Montana Creek (Upper Section)	4/23 - 10/01	2	3	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24. Montana Creek (Middle Section)	4/19 - 10/01	9	11	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25. Montana Creek (Lower Section)	4/19 - 10/01	9	7	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26. Moraine and Glacier Lakes	4/23 - 10/01	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27. Twin Lakes	4/19 - 10/01	34	43	2	0	16	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28. Aurora Harbor	4/19 - 10/01	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29. Harris harbor	4/19 - 10/01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30. Juneau City Dock	4/19 - 10/01	70	39	11	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	1	0	0	6	0	9
31. Rock Dump	4/19 - 10/01	18	9	6	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32. Sheep Creek	4/19 - 10/01	184	190	1	5	0	0	122	105	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33. Douglas Harbor	4/19 - 10/01	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34. Kowee Creek	4/19 - 08/12	7	10	5	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35. Heliport	4/19 - 10/01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36. Fish Creek	4/19 - 10/01	86	58	6	8	0	0	34	22	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37. North Douglas Boat Ramp	4/19 - 10/01	26	18	1	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38. Picnic Cove	4/19 - 10/01	200	119	11	0	1	0	32	0	0	0	1	0	0	0	0	0	0	0	1	0	0	1	0	4
39. Peterson Creek	4/19 - 10/01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total		2,011	1,459	150	205	39	45	367	197	10	0	13	35	2	0	0	9	0	0	2	0	0	25	3	52

* Kept

** Released

Table 3. Juneau Roadside Creel Survey - Estimated Effort and Harvest, April 17 to October 1, 1983.

Area	Sample Period	Rod Hours	DV K*	DV R**	SS K	SS R	PS K	PS R	CS K	CS R	CT K	CT R	SH K	SH R	RT K	RT R	KS K	KS R	H K	H R	BT K	FF K	RF K	OTHER K
1. Echo Cove	04/24 - 09/25	3,254	87	119	0	0	893	10	0	0	29	0	0	0	0	0	0	0	0	0	0	0	0	0
2. Cowee Creek	04/18 - 09/28	3,092	603	1,463	161	1,035	448	152	14	0	31	0	0	0	0	0	0	0	0	0	0	0	0	44
3. North Bridget Cove	04/17 - 09/28	520	339	151	0	0	33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4. South Bridget Cove	04/17 - 09/28	446	167	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5. Sunshine Cove	04/17 - 09/28	971	303	48	0	0	16	0	0	0	16	0	0	0	0	0	0	0	0	0	0	0	0	0
6. Sunrise Beach	04/17 - 09/28	1,171	113	56	0	0	191	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7. Yankee Cove	04/17 - 09/28	41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8. End of the Road Bluffs	04/17 - 09/28	1,161	160	62	0	0	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	31	31
9. Eagle Beach	04/17 - 09/28	356	66	300	33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33
10. Scout Camp	06/08 - 07/17	495	42	338	0	0	63	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11. Amalga Harbor	04/17 - 09/28	2,131	22	344	22	0	264	683	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12. Peterson Creek	04/17 - 09/28	1,526	9	205	104	54	9	0	0	0	9	18	18	0	0	9	0	0	0	0	0	45	0	0
13. Shrine Island	04/17 - 09/28	5,011	353	144	65	0	642	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	139
14. Inspiration Point	04/17 - 09/28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15. Tee Harbor	04/17 - 09/28	31	150	299	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16. Lena Beach	04/17 - 09/28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17. Point Louisa	04/17 - 09/28	6,007	311	470	25	0	950	25	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0
18. Auke Bay Ferry Terminal	04/17 - 09/28	1,453	0	91	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21	0	182
19. Auke Bay Floats	04/17 - 10/01	5,081	176	141	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	453	0	807
20. Auke Creek Mouth	04/17 - 10/01	3,152	0	0	45	0	1,460	1,025	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21. Auke Lake	04/17 - 10/01	362	0	0	0	0	0	0	0	0	0	282	0	0	0	0	0	0	0	0	0	0	0	0
22. Lake Creek Mouth	04/17 - 10/01	392	0	0	0	0	0	0	0	0	94	345	0	0	0	0	0	0	0	0	0	0	0	0
23. Montana Creek (Upper Section)	04/23 - 10/01	67	0	84	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24. Montana Creek (Middle Section)	04/19 - 10/01	810	0	0	0	0	211	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25. Montana Creek (Lower Section)	04/19 - 10/01	385	0	231	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26. Moraine and Glacier Lakes	04/23 - 10/01	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27. Twin Lakes	04/19 - 10/01	2,900	264	0	1,142	72	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28. Aurora Harbor	04/19 - 10/01	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29. Harris Harbor	04/19 - 10/01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30. Juneau City Dock	04/19 - 10/01	2,281	333	0	0	0	81	0	30	0	0	0	0	0	0	0	0	0	44	0	0	137	0	244
31. Rock Dump	04/19 - 10/01	531	184	0	0	0	31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32. Sheep Creek	04/19 - 10/01	7,528	30	366	0	0	5,585	7,188	84	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33. Douglas Harbor	04/19 - 10/01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34. Kowee Creek	04/19 - 10/01	203	116	372	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35. Heliport	04/19 - 08/12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36. Fish Creek	04/19 - 10/01	1,687	265	431	0	0	822	430	92	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37. North Douglas Boat Ramp	04/19 - 10/01	784	14	0	0	0	41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38. Picnic Cove	04/19 - 10/01	6,650	543	0	71	0	907	0	0	0	12	0	0	0	0	0	0	0	12	0	0	71	0	283
39. Peterson Creek	04/19 - 10/01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total		60,523	4,650	5,715	1,668	1,161	12,663	9,553	235	0	191	645	18	0	0	9	0	0	56	0	0	752	51	1,763

* Kept

** Released

Table 4. Juneau Roadside Creel Survey - Unexpanded Interview Data, October 2 to October 29, 1983.

Area	Anglers	Rod Hours	DV K*	DV R**	SS K	SS R	CS K	CS R
2. Cowee Creek	40	58	0	0	5	1	0	5
12. Peterson Creek	18	23	2	3	1	3	0	0
20. Auke Creek Mouth	0	0	0	0	0	0	0	0
21. Auke Lake	0	0	0	0	0	0	0	0
22. Lake Creek Mouth	0	0	0	0	0	0	0	0
23. Montana Creek (Upper Section)	0	0	0	0	0	0	0	0
24. Montana Creek (Middle Section)	0	0	0	0	0	0	0	0
25. Montana Creek (Lower Section)	1	0	0	0	0	0	0	0
27. Twin Lakes	0	0	0	0	0	0	0	5
Total	59	81	2	3	6	4	0	5

* Kept
** Released

Table 5. Juneau Roadside Creel Survey - Estimated Effort and Harvest, October 2 to October 29, 1983.

Area	Rod Hours	DV K*	DV R**	SS K	SS R	CS K	CS R
2. Cowee Creek	283	0	0	26	2	0	25
12. Peterson Creek	192	10	15	14	24	0	0
20. Auke Creek Mouth	0	0	0	0	0	0	0
21. Auke Lake	0	0	0	0	0	0	0
22. Lake Creek Mouth	0	0	0	0	0	0	0
23. Montana Creek (Upper Section)	0	0	0	0	0	0	0
24. Montana Creek (Middle Section)	0	0	0	0	0	0	0
25. Montana Creek (Lower Section)	0	0	0	0	0	0	0
27. Twin Lakes	0	0	0	0	0	0	0
Total	475	10	15	40	26	0	25

* Kept
** Released

Table 6. Juneau Roadside Creel Survey - Estimated Effort and Harvest, April 17 to October 1, 1983, (Calculated for Each Month After Pooling Area Data).

	April last two weeks	May	June	July	August	September	October*
Rod Hours	866	6,696	7,907	19,038	7,441	1,295	497
Harvest							
Dolly Varden Kept	102	487	658	1,865	222	75	7
Dolly Varden Released	318	679	579	2,189	517	194	10
Coho Salmon Kept	57	0	270	217	117	185	45
Coho Salmon Released	0	0	0	1,056	117	84	25
Pink Salmon Kept	0	0	77	4,918	3,226	0	0
Pink Salmon Released	0	0	0	2,794	2,549	0	0
Chum Kept	0	0	0	165	71	0	0
Chum Released	0	0	0	0	0	0	5
Cutthroat Kept	0	39	117	35	0	34	0
Cutthroat Released	57	260	116	0	0	59	0
Steelhead Kept	0	26	0	0	0	0	0
Steelhead Released	0	0	0	0	0	0	0
Rainbow Trout Kept	0	0	0	0	0	0	0
Rainbow Trout Released	0	0	0	0	0	9	0
Chinook Salmon Kept	0	0	0	0	0	0	0
Chinook Salmon Released	0	0	0	0	0	0	0
Halibut Kept	0	0	0	48	0	0	0
Halibut Released	0	0	0	0	0	0	0
Brook Char Kept	0	0	0	0	0	0	0
Flatfish Kept	0	91	235	83	147	25	0
Rockfish Kept	11	0	27	0	0	0	0
Cod Kept	0	687	622	249	103	0	15

* Only 9 of the 39 areas were surveyed.

Table 7. Length-Frequency Distribution of Dolly Varden Harvested Along the Juneau Roadside in 1983.

LENGTH	FREQUENCY	PERCENT	CUMULATIVE PERCENT
140	1	0.8	0.8
229	1	0.8	1.6
241	2	1.6	3.3
254	4	3.3	6.6
260	1	0.8	7.4
267	2	1.6	9.0
279	4	3.3	12.3
280	2	1.6	14.0
292	2	1.6	15.6
300	1	0.8	16.4
305	11	9.0	25.4
310	1	0.8	26.2
318	2	1.6	27.9
320	1	0.8	28.7
325	1	0.8	29.5
330	10	8.1	37.7
336	1	0.8	38.5
340	1	0.8	39.3
343	8	6.6	45.9
356	7	5.7	51.6
360	1	0.8	52.5
362	1	0.8	53.3
368	7	5.7	59.0
381	4	3.3	62.3
385	2	1.6	63.9
387	1	0.8	64.8
394	6	4.9	69.7
406	7	5.7	75.4
419	4	3.3	78.7
425	1	0.8	79.5
430	2	1.6	81.1
432	6	4.9	86.1
435	1	0.8	86.9
444	1	0.8	87.7
450	1	0.8	88.5
455	1	0.8	89.3
457	3	2.5	91.8
483	5	4.1	95.9
495	2	1.6	97.5
508	2	1.6	99.2
549	1	0.8	100.0

Table 8. Length-Frequency Distribution of Dolly Varden Harvested at Each Sample Area Along the Juneau Roadside in 1983.

Area	LENGTH (mm) 125-174	225-274	275-324	325-374	375-424	425-474	475-524	525-574	TOTAL
1. Echo Cove	0	0	4	1	0	0	0	0	5
2. Cowee Creek	0	2	5	8	2	1	1	0	19
3. North Bridget Cove	0	0	3	5	3	4	1	1	17
4. South Bridget Cove	0	1	0	0	0	0	0	0	1
5. Sunshine Cove	0	0	1	0	3	0	0	0	4
6. Sunrise Beach	0	0	1	6	0	1	0	0	8
8. End of the Road Bluffs	0	0	0	2	2	1	0	0	5
9. Eagle Beach	0	0	1	1	0	0	0	0	2
10. Scout Camp	0	0	0	1	1	0	0	0	2
11. Amalga Harbor	0	0	0	1	0	0	0	0	1
12. Peterson Creek	0	0	2	1	0	0	0	0	3
13. Shrine Island	0	0	1	2	2	2	2	0	9
15. Tee Harbor	0	0	0	0	1	1	0	0	2
17. Point Louisa	0	1	3	1	0	1	1	0	7
19. Auke Bay Floats	0	0	0	1	3	0	0	0	4
21. Auke Lake	0	0	0	0	0	2	0	0	2
22. Lake Creek Mouth	0	0	1	1	0	0	0	0	2
27. Twin Lakes	1	1	0	0	0	0	0	0	2
30. Juneau City Dock	0	1	0	2	2	2	4	0	11
31. Rock Dump	0	4	1	1	0	0	0	0	6
32. Sheep Creek	0	0	0	0	1	0	0	0	1
34. Kowee Creek	0	0	0	0	1	0	0	0	1
36. Fish Creek	0	0	0	1	2	0	0	0	3
37. N. Douglas Boat Ramp	0	0	0	0	0	0	0	0	0
38. Picnic Cove	0	0	1	2	1	1	0	0	5
TOTAL	1	10	24	37	24	16	9	1	122

Table 9. Comparison of the Mean Fork Lengths (mm) of Dolly Varden Harvested in Freshwater and Saltwater Areas Along the Juneau Roadside, 1983.

AREA	N	Mean Length	Standard Deviation	Minimum Length	Maximum Length
FRESHWATER	33	338	69	140	483
SALTWATER	89	372	70	229	549

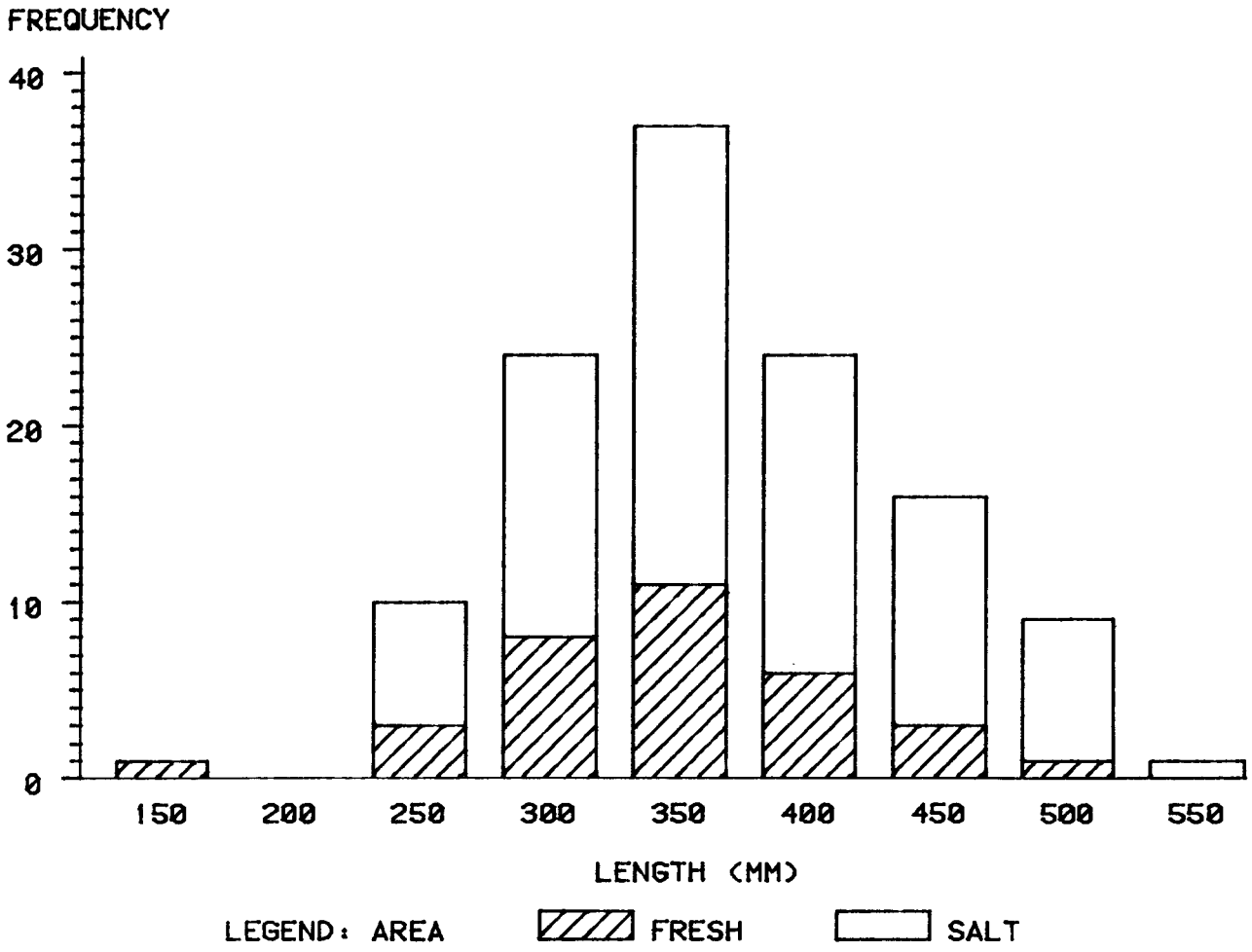

Figure 3. Length-Frequency Distributions of Dolly Varden Harvested in Freshwater and Saltwater Areas Along the Juneau Roadside, 1983.

Table 10. Release and Recovery History of Marked Fish Sampled in the Juneau Roadside Creel Survey, 1983.

Species	Sex	Mark	Date Released	Location Released	Hatchery	Size at Release	Date Recovered	Location Recovered	Length (mm) at Recovery
Dolly Varden	...	Yellow-Dart-tag #00373	5/2/83	Auke Creek Weir	...	320 mm	7/20/83	Lake Creek Mouth	330 mm
Chum Salmon	Male	Adipose Clip No Coded-Wire-Tag	...	...	...	...	8/30/83	Auke Creek Mouth	530 mm
Coho Salmon	Male	Adipose Clip Coded-Wire-Tag #03-17-52	6/./82	Auke Creek	Little Port Walter	11 g	8/30/83	Auke Creek Mouth	540 mm
	Female	Adipose Clip Coded-Wire-Tag #03-17-52	6/./82 Hatchery	Auke Creek	Little Port Walter	11 g	10/07/83	Peterson Creek Mouth	724 mm

Table 11. Voluntary Returns of Dolly Varden Dart Tags Recovered in the Juneau Sport Fishery, 1983.

Location Tagged	Tag No.	Tag Color	Date Released	Date Recovered	Recovery Location
Montana Creek	03021	Red	././82*	5/08/83	Point Louisa Auke
	03724	Red	7/02/83	8/07/83	Auke Bay
Auke Creek	...	Yellow	...	6/28/83	Echo Cove
	00026	Yellow	4/25/83	6/05/83	Auke Bay Docks
	00028	Yellow	4/25/83	4/27/83	Point Louisa
	00131	Yellow	4/26/83	4/27/83	Auke Bay Docks
	00167	Yellow	4/27/83	7/20/83	Fish Creek
	00205	Yellow	4/28/83	5/19/83	Point Louisa
	00224	Yellow	4/28/83	7/17/83	Eagle River Beach
	00329	Yellow	5/02/83	6/25/83	False Pt. Arden
	00373	Yellow	5/02/83	7/20/83	Lake Creek
	00476	Yellow	5/03/83	8/25/83	Auke Bay
	00756	Yellow	5/04/83	./ ./83	Point Louisa
	00872	Yellow	5/04/83	7/26/83	Auke Lake
	00958	Yellow	5/06/83	6/23/83	Eagle River Beach
	01154	Yellow	5/10/83	6/24/83	Auke Bay Docks
	01269	Yellow	5/11/83	7/14/83	Cowee Creek
	01474	Yellow	5/13/83	6/29/83	Point Louisa
	01485	Yellow	5/13/83	...	Auke Bay Dock
	01515	Yellow	5/13/83	6/04/83	Between Lincoln and Ralston Islands

* One of approximately 46 Dolly Varden tagged in Montana Creek in a pilot study in 1982 (Bethers, 1983).

Table 12. Effort and Harvest of the Juneau Roadside Fishery, 1960-1983.*

	1960	1972	Robards 1977	Marriott (79) 1978	1979	1980	1983
Sample Period	...	6/1-9/3	5/1-9/5	5/1-9/5	5/1-9/3	6/1-8/31	4/17-10/1
Angler Trips	1,407	10,105	10,144	19,155	26,722	11,040	32,955
Angler Hours	1,980	22,433	35,227	43,578	59,164	21,528	60,523
Brook Char	7	...	892	222	915	...	...
Dolly Varden Char	2,421	9,152	8,012	8,394	8,563	2,526	4,650
Cutthroat Trout	11	269	1,345	488**	946**	55**	191
Rainbow Trout	8	...	48	...	...	...	0
Steelhead Trout	0	45	...	55	127	...	18
Chinook Salmon	0	56	22	69	166	0	0
Chum Salmon	0	1,390	...	424	561	892	...
Coho Salmon	0	112	690	666	354	82	1,747***
Pink Salmon	15	583	1,474	2,195	10,506	2,116	12,663
Sockeye Salmon	0	56	550	198	58	100	0
Halibut	0	45	...	...	70	48	56
Rockfish	0	...	489	134****	657****	1,517****	51
Flounder	0	...	24	...	...	...	752
Cod	0	...	16	...	...	...	1,966

* 1980 Partial survey. A complete survey would have been approximately 30% higher.
** Cutthroat and rainbow trout combined
*** Includes 1,142 landlocked coho at Twin Lakes
**** Rockfish, flounder, and cod combined

Table 13. Juneau Roadside Hatcheries.

Facility	Organization	Abbreviation	Type	Species currently in production
Auke Creek	National Marine Fishery and Territorial Sportsman	NMFS	Scientific Research	Coho, pink salmon
Kowee Creek	Douglas Island Pink and Chum Salmon Corporation	DIPAC	PNP*	Chum, pink salmon
Salmon Creek	Northern Southeast Region Aquaculture Association	NSRAA	PNP	Coho, chum, pink salmon
Sheep Creek	Douglas Island Pink and Chum Salmon Corporation	DIPAC	PNP	Chum, pink salmon

* Private non-profit corporation

DISCUSSION

Effort and Harvest:

Angling effort reached a new high level in 1983 (Table 12). This was probably caused by an increase in Juneau's population, as well as an increase in angling opportunities. Schwan (1981) listed restrictive Dolly Varden regulations and weak pink salmon runs as prime factors reducing roadside effort in 1980. Both of these problems were at least partially alleviated in 1983. A liberalization of the Dolly Varden regulations in most roadside fishing areas (Neimark, 1984a) provided more opportunities for the Dolly angler and an increase in the Dolly Varden harvest. Enhancement activities greatly increased local fishing opportunities, and the harvest of pink and coho (mostly land-locked coho) salmon.

Enhancement:

Hatcheries. Hatchery production provided an incredible boost to the roadside fishery. This was particularly evident at Sheep Creek, where the effort and harvest exceeded any other roadside area. Both the Sheep Creek and Auke Creek hatcheries produced harvestable surpluses of pink salmon, together generating over 10,000 hours of angling effort, and producing over half of the roadside pink salmon harvest (Table 3). In addition, pinks caught at other roadside areas may have been bound for these or other roadside hatcheries (Table 13). That segment of the hatchery contribution cannot be easily estimated, because pink salmon are not usually marked by the hatcheries due to the cost of tagging and tag recovery projects. However, some tagging of pink salmon should be recommended. This could have resolved conflicts between DIPAC and NSRAA hatcheries claiming the right to harvest pink salmon of unknown origin.

While the benefits of hatcheries are obvious to the roadside fishery, it should be noted that these benefits are not without costs. This is particularly true: 1) if closures of sport fishing areas are required to allow for brood stock recovery, 2) if hatchery returns of one species have a negative impact on fishing for other species, particularly in the marine recreational fishery, or 3) if hatchery production falls short of the sacrificed natural production. For example, in 1983, the Salmon Creek hatchery staff requested and received special permission to collect more than their scheduled number of eggs from wild stock coho. However, in 1984, they suspended operations before the fry could be reared to the smolt stage, and they released the fry in watersheds that probably did not have adequate rearing areas.

The Department of Fish and Game is currently reviewing permit requests for PNP hatcheries on Fish Creek and Peterson Creek. The need for these facilities, which would produce mostly pink salmon, is questionable. While the demand for pinks was clearly demonstrated in 1983, there was an indication that the supply of pink salmon satisfied the demand. Catch rates for pink salmon at the Auke Creek and Sheep Creek hatcheries were exceptional compared to catch rates for pinks at other areas or catch rates for other species harvested in the roadside or marine-boat fisheries. In July, a pink was landed for every hour of fishing at Sheep Creek and every

1.3 hours at Auke Creek. In August, these rates became even more impressive, as pinks were landed at Sheep Creek and Auke Creek every 0.4 and 1.1 hours, respectively. (These figures include pinks caught and released.)

There was also an indication that community subsistence needs were met. The Auke Creek hatchery was unable to give away much of its surplus return.

Since the 1984 pink salmon return is expected to be even larger than the 1983 run, the benefit to cost ratio of additional pink salmon hatcheries is minimal until the demand significantly increases or the efficiency of commercial harvesting operations increases, decreasing the supply of pink salmon available to roadside anglers.

Rather than simply increasing the abundance of pink salmon, hatcheries could better serve roadside anglers by increasing the time period during which "bright" (good quality) pinks are available. During May and June, the availability of sport species for roadside anglers is limited. An earlier run of pink salmon would greatly increase roadside angling opportunities and relieve angling pressure on depleted Dolly Varden stocks. In August, anglers released an increased proportion of the pinks that they landed (44% in 1983). If more bright fish were available, more pinks may be retained by anglers. While extending run time could add to hatchery production costs, it could also increase profits by assuring that a quality product would be available to markets for a greater period of time. From the sportsman's viewpoint, a more clearly defined need exists for hatchery enhancement of much preferred species, including steelhead and cutthroat (Schwan, 1984). The Division of Sport Fish is attempting to address this need (Neimark, 1984b).

Stocking. The success of experimental stocking projects varied. On the one hand, a coho smolt plant at Twin Lakes sustained a very popular sport fishery. Anglers expended 2,900 hours of effort and harvested over 1,100 coho. These figures do not include the effort and harvest during the winter ice fishery, or the children's fishing tournament. Over 300 children participated in that event, sponsored by a local sporting goods store (Neimark, 1984b). On the other hand, the stocking of Moraine and Glacier Lakes with 354 cutthroat (transplanted from Shelter Lake) turned out to be a dismal failure. Despite televised news coverage of the event that occurred on September 20, 1982, almost no one fished there the following summer, and no fish were harvested. These lakes had a history of very light (Baade, 1961) to moderate use in the past (Wadman, 1963).

Several factors may have accounted for the very limited use of this area:

1) these lakes are part of the Mendenhall ponds recreational area in the Tongass National Forest. At one time it was possible to drive into this area, but the Forest Service eliminated vehicle access to discourage people from dumping trash in the area. This may also have discouraged people from fishing there.

2) Without a map, it is difficult to find Moraine and Glacier Lakes; perhaps, directional signs should be posted.

3) The cutthroat were not very large when planted (mean length=142 mm). Their present size and numbers are not known, but this should be investigated. If test fishing indicates the existence of a harvestable population of cutthroat, a news release should be issued to renotify anglers of the opportunity and the location of these lakes.

The Division of Sport Fish is planning to stock Dolly Varden in Moraine and Glacier Lakes. This is not advisable because it is highly unlikely that stocking Dolly Varden, which are much less desirable to anglers than cutthroat (Schwan, 1984), will generate interest where cutthroat failed. Also, Dollies might compete with any surviving cutthroat for food and territory.

In the future, stocking should be restricted to areas which are most likely to be utilized. Experimental stocking of Twin Lakes should continue despite recent pollution problems and uncertainty of a stocking source (Neimark, 1984b).

Dolly Varden Studies:

Dolly Varden catch rates continued to decline to a record low level of 0.077 Dollies per hour (non-targeted effort) in 1983 (Figure 4).

However, it is dangerous to compare yearly catch rates for Dolly Varden. These rates have characteristically been reported as Dolly Varden caught (and kept) per all hours of fishing. Thus, a large amount of effort for pink salmon in 1983 could have artificially reduced the Dolly catch rate. In addition, the rates will be affected by the choice of survey areas and the sampling period.

The number of Auke Creek Dolly Varden outmigrants has varied in recent years; however, what is consistent is a conspicuous shortage of Dollies larger than 300 mm (Neimark, 1984a). Most Dollies larger than 300mm are sexually mature, and some mortality occurs after spawning (Heiser, 1966). Those that do not die are subjected to fishing pressure; therefore, few large Dollies survive to spawn again. This is unfortunate because the larger Dollies are more fecund (Blackett, 1968) and most able to replenish the population.

Regulatory closures offer effective protection to Dollies in Montana Creek and Auke Lake. However, there is no evidence to indicate that this will be sufficient to allow rebuilding of Dolly populations in other roadside systems. A total closure of freshwater areas might be biologically prudent; but this is not recommended, because it would severely limit freshwater fishing opportunities. The need for more public awareness of the local regulations was demonstrated by voluntary returns of tags from Dollies caught in Auke Lake. More regulatory markers should be posted in restricted areas.

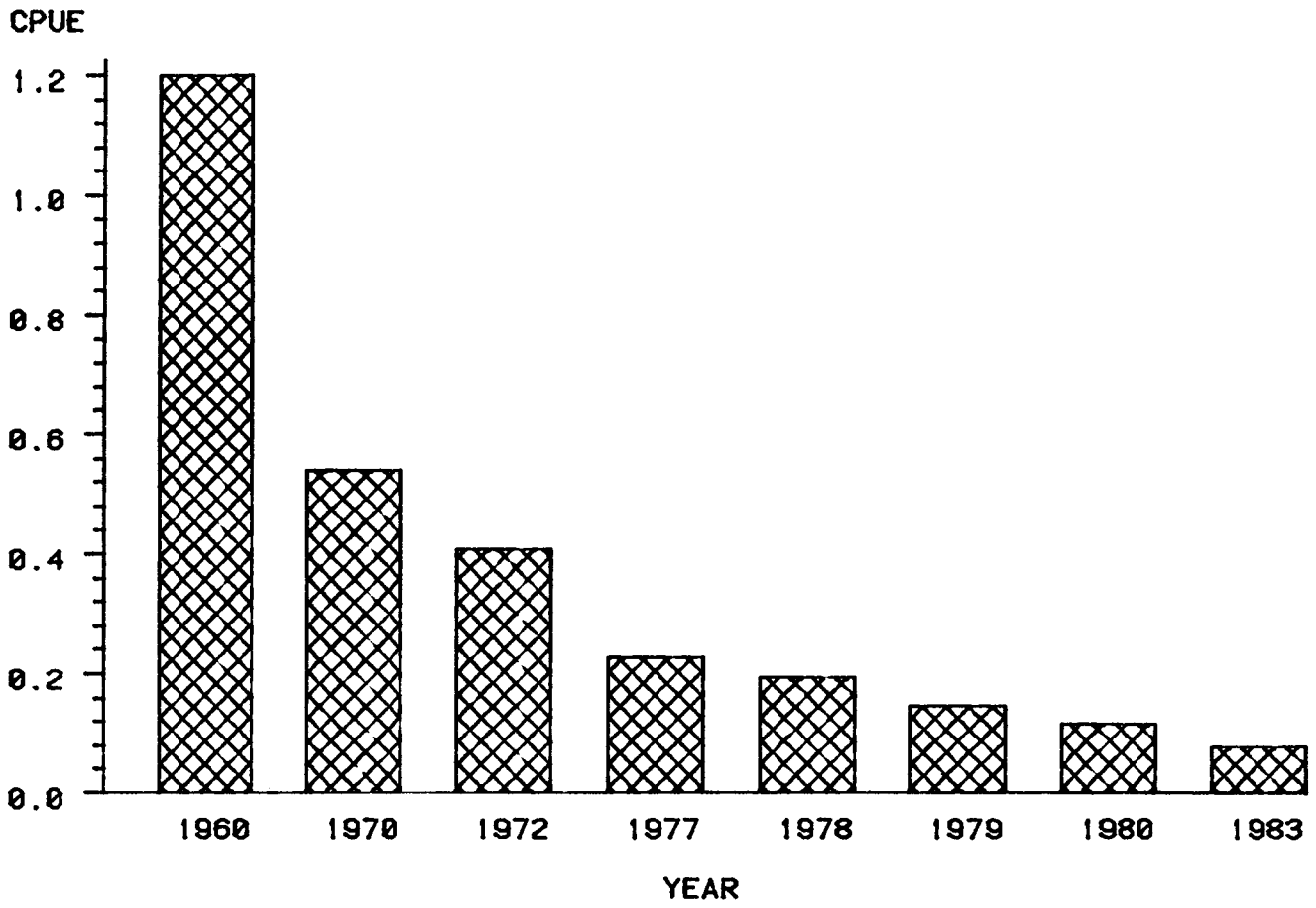

Figure 4. Catch Rates for Dolly Varden Harvested by the Juneau Roadside Sport Fishery, 1960-1983 (Dolly Varden Harvested per Hour of Non-Targeted Angling Effort).

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